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MEADE COTTON, AN UPLAND LONG-STAPLE VARIETY REPLACING SEA ISLAND.

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NEED OF REPLACING SEA ISLAND COTTON.

Since the arrival of the boll weevil in the Sea Island cotton districts of the southeastern United States the production of this valuable fiber has been rapidly declining. The large growth of the plants and the late maturity of the crop render Sea Island cotton particularly susceptible to injury by the weevil. From an average yearly production of 90,000 bales in the 10 years before 1917, less than 2,000 bales have been reported from the 1920 crop.

For several years before the boll weevil reached the Atlantic seaboard it was evident that this insect was likely to destroy the Sea Island cotton industry. Efforts were made to develop earlier strains of the Sea Island type in the hope that production might be continued, but in this direction no practical results have been obtained. During the same period experimental plantings of Meade cotton, a new variety of the Upland type developed in northeastern Texas, gave indications of being adapted to the southeastern conditions and showed promise of success as a substitute for Sea Island cotton. Meade cotton is an early-maturing long-staple Upland variety producing a

fiber under favorable conditions $1\frac{1}{16}$ inches long, of fine texture and quality, and remarkably like the Sea Island cotton. Moreover, on account of its nearly smooth seeds Meade cotton can be handled on the regular Sea Island gins.

DECLINE OF THE SEA ISLAND INDUSTRY.

The spread of the boll weevil to include the entire Sea Island section of the Southeastern States was foreseen several years ago, and it was generally conceded that the rank-growing, late-fruiting habits of the Sea Island cotton would make it particularly susceptible to injury from this pest. That this prediction is being rapidly fulfilled and that the complete destruction of the Sea Island industry is threatened are indicated by the rapid decline in the production of this fiber, as follows:

	Bales.		Bales.
1916	117,559	1919	6,916
1917	92,619	1920	1,868
1918	52,208		

With the increasing demand for high-grade fiber for war purposes the situation became acute, and efforts to preserve the industry were made by the United States Department of Agriculture in cooperation with the State agricultural experiment stations in the Sea Island belt. Only two avenues of approach seemed open—either the development of an early strain of Sea Island cotton, from which profitable crops could be grown in the presence of the boll weevil, or the substitution of an Upland variety that combined the superior cultural features of this type with a fiber comparable in length and fineness to the Sea Island.

VALUE OF MEADE COTTON AS A SUBSTITUTE FOR SEA ISLAND DEMONSTRATED.

The favorable results from the first experimental plantings in 1916 with Meade cotton on the Sea Islands around Charleston, S. C., led to small commercial plantings the following season at several points in Georgia. Since 1917 the area devoted to Meade cotton has been steadily increasing, but not so rapidly as was at first expected, owing to the failure of many farmers to appreciate the necessity of separating the fields of Meade from other cotton and ginning the crop on a clean gin. The consequent mixing and loss of purity of the stock have prevented the rapid increase in supplies of pure seed that would have been possible if the necessary precautions had been taken.

During the five years that Meade cotton has been grown in the Southeastern States it has continued to demonstrate its value as a substitute for the Sea Island. Where definite comparisons have been possible it has produced at least twice as much as the Sea Island

cotton and not less than the short-staple cotton varieties under the same conditions. The price relation of Meade fiber to the fiber of short-staple varieties may be expected to be at least two to one in favor of the Meade, whatever the price of short cotton may be.

ORIGIN OF THE MEADE VARIETY.

The Meade cotton originated from a selection made in 1912 at Clarksville, Tex., in a field of a variety locally called Blackseed, or Black Rattler, but not the same as the varieties that have carried these names in other parts of the cotton belt (*14*, 1918, p. 3; 1919, p. 26; 1920, p. 4).[1]

The possibility of producing from this stock an Upland variety that would rival the Sea Island cotton in length and fineness of staple and at the same time possess the cultural advantages of an Upland cotton appealed very strongly to Mr. Rowland M. Meade, at that time an assistant in cotton breeding in the Bureau of Plant Industry. Three generations of progenies from select individuals had been grown, and a superior stock had been separated before the sudden death of Mr. Meade in 1916. The new variety was named for Mr. Meade as a tribute of the personal regard of his associates and to commemorate his services as a plant breeder.[2]

MEADE COTTON NOT A HYBRID.

Unauthorized statements have appeared in newspapers and agricultural journals referring to Meade cotton as a new early Sea Island variety or as a hybrid between the Upland and Sea Island types, but such accounts are erroneous. Meade cotton was not produced by hybridization, but is the result of the discovery and continued selection of a superior type. It has been assumed that a variety like the Meade must be a hybrid because the plant is like Upland and the lint like Sea Island, but this reasoning is not in accord with the facts.

Many attempts have been made to combine the superior fiber of the Sea Island or Egyptian types of cotton with the desirable cultural characters of the Upland varieties. While crossing is readily accomplished and the results frequently appear promising in the first generation, no hybrid stock has yet been developed that was sufficiently uniform to justify commercial planting. Meade cotton is a separate and distinct variety that combines the superior cultural features of the Upland type with a long and silky fiber like that of the Sea Island. The uniformity of Meade cotton at once places it in a different class from any stocks known to have a direct hybrid origin.

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[1] The serial numbers (italic) in parentheses refer to "Literature cited" at the end of this bulletin.

[2] This paragraph and a few others are adapted with slight revision from an article by O. F. Cook (*5*).

DESCRIPTION OF THE VARIETY.

The following description of the Meade variety has been published (*8*) in connection with the distribution of seeds:

Plant erect, of average height, with regular internodes of medium length on both the main stalk and on the vegetative branches. Internodes of the fruiting branches rather long, with little tendency to take the shortened "cluster" form. Leaves of medium size and rather thin texture, not deeply cut, a larger proportion with only three lobes than in most varieties. Involucral bracts of medium size, not exceeding the bolls, with 10 slender teeth. Bolls medium size, with a thin bur, opening readily even under humid conditions. Seeds large, about 3,000 to the pound, nearly naked after the lint has been removed, brownish black, slightly tufted at either end. Lint 1½ to 1$\frac{11}{16}$ inches in length, uniform, with good luster, slightly heavier bodied than Sea Island cotton, scarcely distinguishable from Sea Island when properly ginned. Lint percentage, 26; lint index, 5.5.

VEGETATIVE CHARACTERS LIKE SHORT-STAPLE COTTON.

Though not without distinctive plant characters, Meade cotton has the general appearance and behavior of many of the Upland long-staple and short-staple varieties; for the shape of the plant, the character of the leaves, the earliness in fruiting, and the size of the bolls are very similar to the ordinary Upland sorts. The fiber, however, is so long and fine that when ginned on a roller gin it is freely accepted on the Sea Island markets on a par with the true Sea Island cotton.

As grown in the Southeastern States, Meade cotton or the "long short cotton," as it is sometimes called by the farmers, produces a fiber from 1½ to 1⅝ inches in length under favorable conditions, seldom falling below 1$\frac{7}{16}$ and sometimes attaining 1¾ inches. (Pl. I.)

The fiber on the seed of the Meade variety shows little tendency to "butterfly," that is, to shorten the fibers at the base of the seed, which was one of the undesirable traits of the older Upland long-staple varieties, such as the Floradora, Sunflower, and Allen.

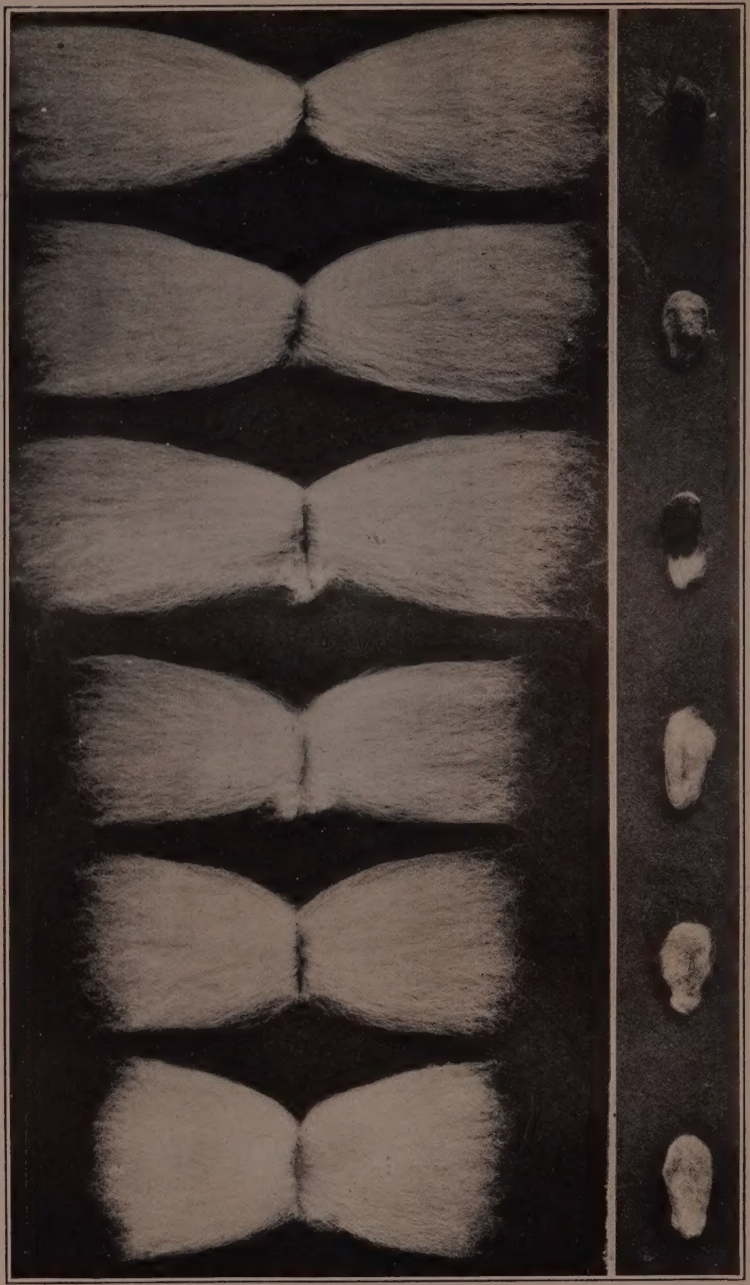
The seeds are large and brownish black, naked on the sides, like Sea Island and Egyptian, with a small tuft of white fuzz at either end. (Pls. I and II.)

MEADE COTTON ADAPTED TO SEA ISLAND CONDITIONS.

With its early, quick-fruiting habits, long and silky fiber, and smooth seeds, permitting the use of roller gins, the new Meade variety seemed to be the only Upland cotton promising any measure of success as a substitute for Sea Island cotton, and with these facts in view work was begun five years ago to adjust the new variety to the local conditions on the Sea Islands of South Carolina.

In 1916 small experimental plantings of the Meade cotton were made on these islands for the purpose of studying the behavior of the variety under eastern conditions. Promising results were se-

COMBED LINT AND SEEDS OF SEA ISLAND AND MEADE COTTON.
(Natural size.)



COMBED LINT AND SEEDS OF SIX SUPERIOR VARIETIES OF COTTON.

In order from top these varieties are Sea Island, Egyptian (Pima), Meade, Durango, Acala, and Lone Star. All of these varieties excepting the Sea Island have been developed by the United States Department of Agriculture and are being extensively grown in different parts of the American cotton belt. (Natural size.)

cured, and in 1917 the experimental plantings were extended throughout the Sea Island district of Georgia in order to ascertain the behavior of this cotton under boll-weevil conditions in comparison with that of the Sea Island type. That these preliminary plantings showed additional promise for the variety is shown by the results obtained.

At Thomasville, Ga., under conditions of extreme boll-weevil infestation, 1 acre of Sea Island and Meade cotton was planted in alternate blocks of four rows. The Meade yielded at the rate of 1,499 pounds of seed cotton per acre and the Sea Island at 501 pounds. At Valdosta, Ga., only small plantings were made to ascertain the comparative earliness of the two types. By September 13 the Meade test rows had yielded 230 pounds of seed cotton, but it was not until September 28 that 117 pounds of seed cotton were secured from the Sea Island rows. In addition to the difference in earliness and yield shown in this test, Table 1 presents the results obtained in a comparison of Meade and Sea Island bolls.

TABLE 1.—*Comparison of Meade and Sea Island bolls grown in alternate rows at Valdosta, Ga., in 1917.*

Variety.	Weight of 10 4-locked bolls (grams).		Percentage of lint.	Lint index.	Number of 4-locked bolls to—			Weight of seed from bale of cotton (pounds).
	Total.	Lint only.			Pound of seed cotton.	Pound of fiber.	500-pound bale.	
Meade	65.70	17.6	26.8	5.45	69	257	128,500	1,365
Sea Island	35.75	10.9	30.7	4.93	126	412	206,000	1,111

This experiment shows that it required 57 more bolls of Sea Island than of Meade cotton to make a pound of seed cotton, 155 more bolls of Sea Island to make a pound of fiber, and 77,500 more bolls of Sea Island to make a 500-pound bale. (Pl. III.)

While the ratio of fiber to seed in the Sea Island was 30.7 per cent and in the Meade 26.8, the actual weight of the fiber from 10 four-locked bolls of each was much greater for the Meade on account of the larger size of the Meade seed.

In addition to these advantages of the Meade over the Sea Island, it should be remembered that a large percentage of the Sea Island bolls have only three locks, while most of the Meade bolls have four locks and a fair percentage have five locks.

At Statesboro, Ga., 5 bushels of Meade seed were used to plant a block of 8 acres. The cooperator was a prominent Sea Island cotton grower, producing that year some 40 bales of this fiber. The 8 acres of Meade cotton produced 6 bales of fiber, and both the Sea Island and Meade crops were ginned on the same gin and baled in the same

manner. Both crops were shipped to Savannah, and samples were submitted to Sea Island cotton buyers with a note that this cotton was offered as a substitute for the Sea Island. It was stapled at 1⅛ inches and sold for 73½ cents a pound, which was one-half cent a pound premium over the prevailing price for the best Georgia Sea Island on that day.

The report of this sale naturally attracted the attention of cotton growers throughout the Sea Island belt, and the United States Department of Agriculture received many requests for seed of the Meade variety. At that time the supply of this seed was very small, and no general distribution could be made, but it was hoped to produce from the 1918 plantings enough seed for a large acreage in 1919.

INCREASING SEED SUPPLIES IN 1918.

The preliminary experiments having shown much promise for the Meade variety as a practical substitute for the Sea Island cotton, plans were laid for a rapid increase in the seed supply from the 1918 plantings.

Several reliable farmers scattered throughout the Sea Island district of Georgia and South Carolina were willing to cooperate with the United States Department of Agriculture in its efforts to provide an adequate supply of pure seed. Sufficient seed was furnished by the department to plant from 5 to 75 acres, under an agreement that to prevent possible crossing with other varieties the plantings would be made in isolated fields at least 300 yards from any other kind of cotton; or if this was not practicable, 50 or 60 rows of corn should be grown between the Meade and any other variety. Representatives of the department were to visit the plantings during the season for the purpose of roguing the fields or pulling up the off-type plants and furnishing information in the methods of seed selection. The department was to receive one-third of the seed grown from the crop, while the farmer retained the lint and the remaining two-thirds of the seed for his own use or to sell to his neighbors and thus make it possible to establish community production of Meade cotton and maintain adequate supplies of pure seed.

FARMERS FAIL TO ISOLATE PLANTINGS.

An inspection of these plantings in June of that year showed that while some of the farmers had observed the precaution of isolating the Meade field many of the plantings were not separated from other cotton and on that account were useless for pure-seed purposes. Some of the plantings were close to Sea Island fields and others to short-staple Upland varieties or mixed stocks. In several cases where poor stands of the Meade had been secured replanting had been done with Sea Island seed. In one instance 26 acres of Meade cotton had been flanked on one side with a field of Sea Island and on the other by short cotton.

SMALL ACREAGE OF PURE SEED IN 1918.

While not more than 250 acres, all told, of the Meade plantings in 1918 had been sufficiently separated from other kinds of cotton to insure their freedom from possible hybridization, it was thought that with careful handling sufficient seed of good quality would be available for a large acreage in 1919. With the assistance of the farmers these fields were carefully inspected and all hybrids and off-type plants were destroyed.

Though familiarity with Meade cotton is usually necessary to distinguish some of the off-type plants, the hybrids between the Sea Island and Meade cottons are easily recognized by their larger and deeper cut leaves, in which they resemble the true Sea Island. Once these plants are pointed out and their contrasting features noted they are easily recognized, even by those who have not done any special breeding work. (Pls. IV and V.)

SELECTION WORK CONTINUED IN THE HARVEST SEASON.

During the harvest season the plantings that had been sufficiently isolated were again visited for the purpose of instructing the farmers in the methods of seed selection for breeding stocks. From 100 to 200 plants that conformed to the Meade type were selected from each of the isolated fields for separate picking and ginning, the seed of which was to be used for a seed-increase block the following season. In addition to this bulk selection, a number of especially desirable plants were selected for progeny-row planting at each point.

The bulk of the Meade crop was to be ginned on the regular commercial Sea Island gins most convenient to the plantings, except in an experiment near Sylvester, Ga., where a new roller gin had been installed for ginning only Meade cotton. The farmers were warned against the danger of the Meade seed becoming mixed with that of the Sea Island at the gins unless special care were taken to have the gins thoroughly cleaned before the Meade cotton was put through.

GINNING COMPLAINTS FROM MEADE GROWERS.

During the ginning season complaints were received from some of the Meade cotton growers that the Sea Island ginners were objecting to Meade cotton on account of the large size of the seed, which failed to pass through the seed grids (manufactured especially for the small Sea Island seed) as rapidly as the seed of the Sea Island and consequently slowing down the ginning process.[3]

[3] This difficulty in ginning was subsequently met by one of the manufacturers of roller gins, who put a new seed board or grid upon the market designed especially for ginning Meade cotton. (Pl. VI.) This seed board has fingers instead of ribs, doing away with the edge that formerly prevented the passage of seed near the stripper or hacker bar. The fingers are also farther apart than the ribs in the seed board used for Sea Island ginning. It has since been ascertained that moving the ordinary seed grid back from the stripper bar from one-half to three-quarters of an inch permits the Meade seed to fall through without difficulty.

There was no objection to ginning the Meade cotton in the early part of the ginning season, before the Sea Island crop began to come in, but when the latter cotton arrived the Meade was either held up for a lull in the Sea Island ginning or the ginners insisted upon holding the Meade until after the disposal of the Sea Island crop.

On account of such difficulties, many of the farmers who took the trouble to go to the gins personally still failed to carry out the instructions for clean ginning. With the exception of the few bales that were put through before the arrival of the Sea Island crop much of the Meade crop was ginned at intervals between the operations for Sea Island cotton, and no adequate precautions were taken to have the gins cleaned.

RESULTS IN 1918 IN SEA ISLAND DISTRICTS.

Though the failure of the ginners and farmers to cooperate at the gins restricted the quantity of pure Meade seed available for planting in 1919, the results that were secured in the field continued to be encouraging.

At Statesboro, Ga., the same cooperator who had produced 6 bales of Meade cotton on 8 acres in 1917 produced 42 bales of this cotton from a planting of 46 acres in 1918. This cotton was sold on the Sea Island market at Savannah at a premium over the Sea Island quotations, several of the buyers pronouncing the fiber both stronger and of finer texture than the general Sea Island crop of the season.

Near Sylvester, Ga., nine bales of Meade cotton were produced and sold in the spring of 1919 at a slight premium over the prevailing price for Sea Island cotton of similar grade.

At Cobbtown, Ga., five bales of Meade cotton were produced from a planting of 9 acres. These bales were sent to Savannah along with several bales of Sea Island cotton, the whole shipment being marketed as Sea Island cotton.

On Little Edisto Island, S. C., 5 acres were planted to Meade cotton. The field selected by the cooperator was known to be badly infected with the cotton-wilt fungus and had produced a few years before only 192 pounds of Sea Island lint. While a considerable number of Meade plants were badly affected, a large percentage was vigorous and healthy. Three bales of Meade cotton were harvested from this field and were subsequently sold at a premium of 2 cents per pound over the Sea Island cotton on the Charleston market in March, 1919.

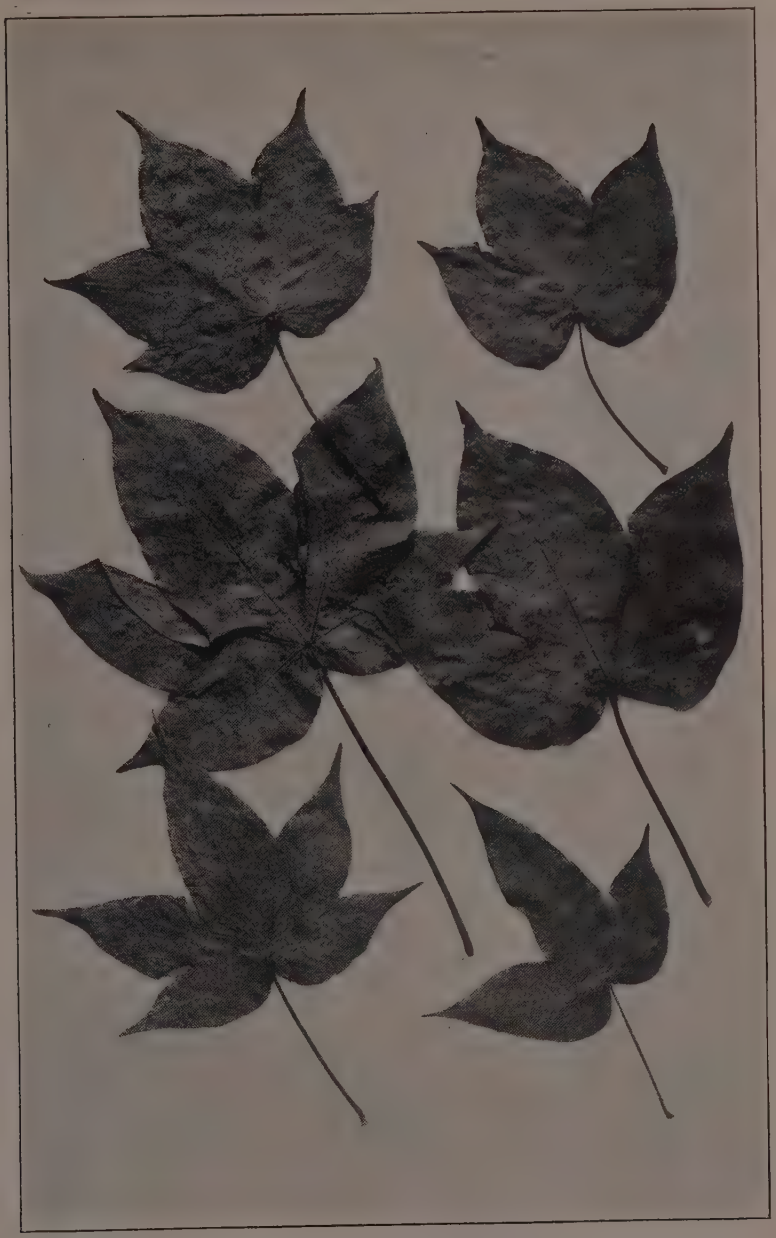
The earliness of the Meade cotton in comparison with the Sea Island was also demonstrated in this planting. The cooperator reported that the entire crop of Meade cotton had been harvested by

MEADE AND SEA ISLAND COTTON BOLLS.

One boll of Meade cotton (top) yields as much as two bolls of Sea Island (bottom). (Natural size.)

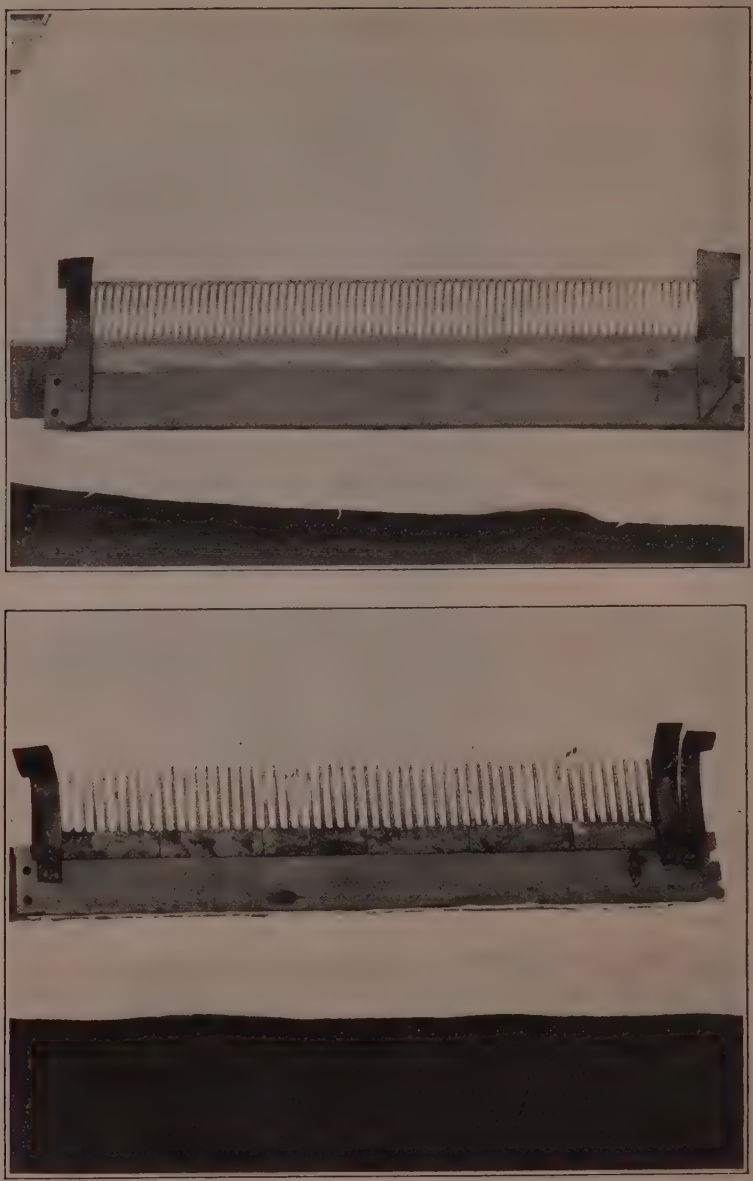
MEADE AND MEADE-SEA ISLAND HYBRID COTTON PLANTS.

A typical Meade plant is shown at the left. The hybrid of Meade and Sea Island shown at the right is undesirable and is to be rogued out of Meade fields. Note the deeply forked leaves of the hybrid, resembling the true Sea Island.



FORMS OF COTTON LEAVES.

Typical Meade leaves are shown at the top, Sea Island leaves at the bottom, and leaves of a hybrid between Meade and Sea Island in the center. The two deeply cleft forms of leaves are to be distinguished from those of Meade cotton in roguing. (Reduced.)



REGULAR SEA ISLAND SEED GRID AND SPECIAL GRID FOR MEADE COTTON.

The seed grid of the regular Sea Island gin is shown in the upper figure. The new grid without bar at the tips of the fingers and a wider space between them to allow the passage of large-sized Meade seed is represented by the lower figure. Setting the regular grid back from the hacker bar three-quarters of an inch also permits Meade seed to pass through without difficulty.

the first of November, while less than 70 per cent of his Sea Island crop had matured at that date.

EXPERIMENTS WITH MEADE COTTON IN 1917 AND 1918.

During the 1918 season additional data were acquired on the relative earliness of the Meade compared with other varieties that showed this cotton to be not only much earlier than the Sea Island, but as early as any of the short-staple varieties now being grown in the Southeastern States.

At the Bureau of Entomology station near Madison, Fla., in a district of heavy weevil infestation, tests were conducted under the direction of Mr. G. D. Smith with several varieties of cotton, including the Meade, King, Express, Webber, and others, besides several strains of Sea Island cotton that had been bred especially for earliness. Flower counts were made daily from June 11, the date of the first flower which appeared on that day in both the Meade and King rows, until August 5, when flowering had practically ceased on all varieties.

The results showed that the Meade variety was as early in producing flowers as any of the short-staple varieties and much earlier than any of the long staples, including the early Sea Island strains. Mr. Smith also reported high yields for the Meade and superiority in both length and abundance of fiber over all the long staples, including the special Sea Island strains.

At Brooksville, Fla., a count was made of the flowers produced each day from June 24 to July 3 on eight rows of Sea Island and eight rows of Meade, each 150 feet long. The Sea Island rows averaged 78.7 flowers and the Meade 153.3 flowers per row per day. The Sea Island yielded 10.3 pounds of seed cotton and the Meade 28.3 pounds per row.

Prof. Loy E. Rast, of the Georgia State College of Agriculture, obtained some very interesting data in 1917 and 1918 on the comparative yields of Sea Island and Meade cotton (*9*). A review of the more important data reported by Prof. Rast may be summarized as follows:

The Meade cotton was planted along with 37 other varieties at the station in 1917 and ranked No. 1 when the total value of both seed and lint were considered, on a basis of 2,039 pounds of seed cotton per acre, or 693 pounds of lint, worth $509.35, and 1,346 pounds of seed, containing 24.27 per cent of oil, making it worth $84.34 per ton, or $56.76 for the seed produced. The total value of the crop, therefore, was $566.11 per acre.

A similar test conducted in 1918 by Prof. Rast showed that this variety again ranked first among 38 varieties tested, the total yield of seed cotton being 1,604 pounds, which gave 465 pounds of lint, valued at that time at 70 cents a pound, or $325.50. The 1,139 pounds of seed contained 23.13 per cent of oil, making it worth $81.31 per ton, or $46.30 per acre. The total value of the cotton and seed, therefore, was $371.80 per acre.

WORK WITH MEADE COTTON IN 1919.

Though adequate supplies of pure seed were not available for general planting in 1919, the stock was sufficient for a wide distribution of small experimental quantities of seed, besides a number of additional larger plantings in other sections of the Sea Island belt.

On account of the failure of many of the Meade cotton growers of 1918 to avoid the contamination of their seed at the gins, it was anticipated that a large quantity of alleged Meade seed that contained a mixture of the Sea Island seed would be sold and planted in 1919. In view of the danger that the reputation for uniformity of the variety might suffer, efforts were made to determine the extent of mixture that actually occurred. Accordingly the names of those farmers who had purchased large quantities of Meade seed were learned, in order that their fields might be inspected.

A visit to a number of these fields in the early season confirmed the suspicion that a mixture of seed had taken place at the gins, for it was found that with only one or two exceptions they contained a large percentage of pure Sea Island plants and practically no hybrids. These farmers were warned that their stock was not pure, that their crop would be a mixture of Sea Island and Meade cotton, and they were advised that, unless all the Sea Island plants were pulled up before flowering, they should dispose of their seed to oil mills at the end of the season.

In striking contrast to these mixed fields was a planting of about 100 acres of Meade cotton near Sylvester, Ga., where the 1918 crop had been ginned on a clean gin. Not a single pure Sea Island plant and not more than a dozen hybrid plants were found in the roguing of the entire acreage. The field was extremely uniform and demonstrated in a most satisfactory manner the possibilities of the variety under conditions of isolation and careful handling.

TABLE 2.—*Yields of Meade and Sea Island cottons in comparable fields of 12 acres each on Little Edisto Island, S. C., in 1919.*

Pickings.	Meade cotton.		Sea Island cotton.	
	Date.	Yield (pounds).	Date.	Yield (pounds).
First picking	Aug. 22	302	Aug. 25	190
Second picking	Aug. 30	1,040	Sept. 5	607
Third picking	Sept. 7	1,253	Sept. 15	733
Fourth picking	Sept. 17	1,487	Sept. 29	349
Fifth picking	Oct. 7	2,657	Oct. 3	769
Sixth picking	Oct. 31	1,200	Oct. 31	100
Total		7,999		2,748

On Little Edisto Island, S. C., two fields of cotton, each of 12 acres, were planted. One of the fields was planted to Meade and

the other to Sea Island cotton, and the conditions under which the plantings were made were as nearly alike as possible. The 1919 season was marked by almost continuous rains in this section during July and August, accompanied by a heavy infestation of boll weevils. The yields from these plantings are shown in Table 2.

The relative earliness of the Meade can be seen by a comparison of the yields on the several picking dates.

RESULTS FROM 1919 PLANTINGS.

While something like 3,000 acres had been planted to Meade cotton in 1919, not more than 500 acres had been given the required isolation to prevent possible hybridization with other varieties in adjacent fields. With such a small acreage for the production of pure seed it was evident that the expectations of developing a large supply for the 1920 plantings were not to be realized. It was also expected that from the remaining 2,500 acres of this cotton a large quantity of mixed fiber and seed would appear on the market and that the fiber and the seed as well might be sold as Meade, with further damage to the reputation for uniformity of the variety. To prevent this as far as possible brief statements were issued by the United States Department of Agriculture, summarizing the work that had been done with Meade cotton and advising buyers and manufacturers of the existence of the mixed stocks, so that the variety might not be condemned unjustly if mixed fiber was encountered (*10*).

While the net results from the 1919 plantings were again disappointing from the standpoint of producing a large increase in the supplies of pure seed, the behavior of the crop continued to demonstrate the practicability of the use of Meade cotton as a substitute for the Sea Island variety under boll-weevil conditions. The problem of replacing Sea Island with Meade cotton was dependent, however, upon the extent of cooperation that could be developed among the farmers and ginners to provide the necessary facilities for producing and maintaining an adequate supply of pure seed.

EXTENDING THE CULTIVATION OF MEADE COTTON IN 1920.

With the supply of pure seed still small, the distribution of small lots for experimental plantings was discontinued in 1920. Seed was sent out only to those localities in the Sea Island belt where good results had already been secured and to responsible farmers who could guarantee isolation for planting and the clean ginning of the crop.

In addition to these precautions, most of the successful cooperators of 1919 agreed to confine as far as possible the sale of their seed to their own immediate locality and to those farmers who could

provide the proper facilities for growing and handling the crop. In this way it was hoped that communities might be organized for growing only the Meade cotton.

STOCKS OF MEADE SEED SCATTERED IN 1920.

The attention that Meade cotton had attracted in Georgia and South Carolina led to numerous inquiries for seed from other sections of the cotton belt, particularly Arkansas and Texas, and in order to ascertain the amount purchased in other sections a list of the names and addresses of farmers to whom Meade seed had been sold and the quantity purchased by each was obtained from the cooperators who had supplies for sale. It was found that while a few of the growers had confined their sales to their own locality, a number had sold seed to farmers in Arkansas and Texas and even to Haiti in the West Indies, where a sufficient quantity had been sent to plant about 2,500 acres.

Numerous plantings of the Meade variety have been made in Texas, Arkansas, Arizona, and California, but the results generally do not encourage growing it in these States on a commercial scale. Favorable local conditions may be found, but Meade cotton, like all other extra long-staple varieties, is subject to injury from drought, such as is likely to occur in either Arkansas or Texas. Drought weakens the fiber and withers the bolls, causing them to split immaturely. Even in favorable seasons it still is necessary to gin the Meade cotton on roller gins, not generally available, and farmers are advised not to attempt to introduce this variety in short-staple Upland districts.

Disregarding such warnings, several hundred bushels of Meade seed were purchased and planted in both Texas and Arkansas. In one county alone in the western part of the latter State about 200 acres were grown.[4]

The absence of roller gins made it certain that the production from these fields would be ginned on a saw gin and probably marketed as Meade cotton. To prevent further damaging criticism of the variety, a warning statement was issued to buyers and manufacturers against the probable appearance on the market of this gin-cut cotton (*11*).

PLANTINGS IN SOUTH CAROLINA IN 1920.

Although not more than 500 acres of Meade cotton were found to be sufficiently isolated in South Carolina to warrant roguing, more interest in the variety was found among some of the Sea Island cotton growers who had for many years been producing the finest grades of Sea Island fiber.

[4] It was subsequently ascertained that the crop from these 200 acres was ginned on a saw gin and badly gin cut. While the injury to the fiber was recognized by the farmers, the variety did so well in other respects that 6,000 acres were planted in 1921.

INSPECTION OF MEADE FIELDS IN GEORGIA.

In cooperation with the extension division of the Georgia State College of Agriculture, arrangements were made in the spring of 1920 to inspect all the Meade plantings in Georgia, in order to locate the fields sufficiently isolated from other cotton to warrant roguing and to ascertain approximately the total acreage devoted to this crop in that State.

It was found that while more than 5,000 acres had been planted to Meade cotton, fully half of this acreage had been planted either in the same field with short cotton or so close to other varieties that mixing was certain. The remaining 2,500 acres were well isolated, and with promises of being properly ginned the fields were carefully inspected by either representatives of the State College or of the U. S. Department of Agriculture and the off-type plants removed.

The largest single acreages of Meade cotton were in Worth County, where about 400 acres had been planted on one farm and close to 200 acres on another in the immediate vicinity. Both of these plantings were well isolated, and on account of extreme care in growing this variety through three previous seasons not more than 30 hybrids or off-type plants were removed from both fields. (Pl. VII, figs. 1 and 2.)

ENCOURAGEMENT OF MEADE COTTON IN GEORGIA.

During the 1920 season, a publicity campaign for Meade cotton was carried through by the State and local interests in Georgia (*1*) that did much to increase the popularity of the variety.

A leaflet entitled "Meade Cotton" (*6*) was published by the Georgia Breeders' Association[5], containing 10 brief pointed paragraphs on the origin of the variety and the history of its development in Georgia, as well as information on the comparative merits of the Meade and the Sea Island fiber for spinning purposes. The pamphlet announced that "Meade cotton from a large proportion of the acreage that was planted from pure seed is being concentrated in three warehouses in Georgia, so that spinners may have the advantage of knowing where they can get Meade cotton in quantity."

The following statement from the same leaflet explains the method of tracing impure stocks of seed, in the hope that these inferior stocks might be eliminated:

> It is possible that some Meade cotton grown in areas contiguous to short-staple cotton may be of inferior staple and may not be eliminated in the warehouses. If spinners should get bales of mixed or inferior staple they will please notify the warehouse from which the cotton came, or notify the secretary of the Georgia Breeders' Association, at Athens, Ga. This information will be used in checking against impure seed, and standardization will be accomplished the more rapidly.

[5] The secretary of the Association is R. R. Childs, Athens, Ga.

Under the auspices of the division of agronomy of the Georgia State College[6] a farmers' meeting was held in Worth County on a farm which had been devoted to the growing of Meade cotton for three successive years. September 9, 1920, was extensively advertised as "Meade Day," and all farmers and others interested in Meade cotton were invited to help inspect the variety growing in the fields and see a demonstration of the value of selection to maintain uniformity and also a demonstration of the proper methods of ginning and baling the crop. (Pl. VIII.) Farmers from all over the State attended, as well as officials of the Georgia State College, the Georgia Breeders' Association, county agents, and representatives of the United States Department of Agriculture.

PRODUCTION OF MEADE COTTON IN 1920.

It has been difficult to obtain accurate data on the total production of Meade cotton for the 1920 season. It is reasonably certain, however, that fully 2,000 bales of this variety were produced, some of which probably has been marketed as Sea Island cotton and is included in the less than 2,000 bales so far reported for that crop.

With very few exceptions the several crops of Meade cotton grown by cooperators have been placed on the market and sold on their own merits as Meade, but a large percentage of the bales produced by other farmers have been offered as Sea Island and have been accepted on the market as such without question. Since the merits of the Meade variety have now been established, however, there appears to be no reason why the cotton should not be marked with its own name.

The United States Department of Agriculture received many requests during the winter and early spring of 1921 for information and for seed of the Meade variety. It is significant that all of the old Meade growers are planting this variety again and increasing their acreage, while a number of new cooperators are growing Meade cotton on a large scale. Among these are several growers who have been for years producing the finest grades of Sea Island cotton. These men know how to maintain the purity and uniformity of a superior cotton and should be able to develop the Meade variety to the same high standard that they reached with the Sea Island.

In order to encourage the community production of Meade cotton the Georgia State authorities selected 10 localities scattered throughout the State in which special efforts would be made to persuade the farmers to grow only Meade cotton in 1921.

[6] This division has the following staff: J. R. Fain, professor of agronomy; R. R. Childs, in charge of cotton industry; and F. C. Ward, cotton specialist, assisted by E. C. Westbrook.

CULTIVATION OF MEADE COTTON.

There has been a general feeling among farmers that Meade cotton requires some special method of cultivation to secure the best results. No special treatment is necessary for this variety other than that provided for short cotton except that more continuously good growing conditions need to be provided and more care is needed in harvesting and ginning the crop. Failure to provide these conditions affects the length, abundance, and quality of the fiber.

The first essential step to be taken by the farmer intending to grow Meade cotton on a commercial scale is to obtain a good stock of seed. Even at the high price of $5 to $6 a bushel good seed is cheap compared to poor seed at $2 a bushel, because good seed produces larger and more uniform crops of cotton that command a premium on the market, while poor seed yields small crops of mixed fiber which, if detected in the bales, is either unsalable or heavily penalized.[7]

With a stock of good seed the next important consideration is proper isolation for the planting on a well-drained piece of land. If there is any idea of saving the seed to use for planting, the fields should be at least 300 yards distant from any other cotton—the farther away the better. Where a sufficient distance can not be obtained, separation by fields of corn or sorghum may increase the element of safety, since everything depends upon the activity of the insects that visit the flowers. The cotton pollen grains are sticky and are not carried by the wind.

With the proper isolation provided and thorough preparation of the land before planting, from three-fourths of a bushel to a bushel of seed to the acre should be used, depending upon the type of soil, the heavier soils requiring the larger quantity.

The quantity of fertilizer that should be used as well as the proportion of the elements of which it is composed varies in the different localities, but the requirements of Meade cotton will not differ from the local varieties.[8]

The only special requirement for the production of long-staple cotton is that the plants be not forced into overrank growth or checked by drought or other unfavorable conditions. In other words, uniform, equable conditions are required, without extremes on either side to interfere with the gradual, normal development of the crop.

During the growing season the soil about the plants should be kept in good condition by frequent and shallow cultivations. Before flowering time the fields should be carefully inspected in order that

[7] Either the Georgia State College at Athens or the Federal Department of Agriculture at Washington will be pleased to put farmers in touch with stocks of good seed.

[8] Each State agricultural experiment station or State college of agriculture is familiar with local conditions and can advise directly regarding fertilizers and the best time for their application.

all hybrids or off-type plants may be removed, to prevent cross-pollination in the field. Later on in the season inferior plants producing off-type bolls may still be found, and these plants also should be removed.

Like all long-staple cottons the Meade variety must be picked with extreme care to keep the fiber as clean as possible.[9] The seed cotton must be thoroughly and uniformly dried before ginning. There are a number of ways by which this may be accomplished, such as the use of protected platforms, or the lofts of the gin houses, or, if the weather permits, the seed cotton may be spread upon straw mats upon the ground. The cotton must not be more than a few inches in depth and should be turned frequently to allow uniform drying.

It is the belief among farmers that cotton is ready for ginning when the seed cracks between the teeth. Under favorable conditions from two to three weeks should be sufficient, although many of the old Sea Island growers, after thoroughly drying their cotton, store it away until January or February before ginning. By so doing it is claimed that the fiber is given greater luster and strength. Meade cotton must be ginned on a roller gin and the fiber given complete protection in the bale. (Pl. VIII.)

CLOSER SPACING WITH MEADE COTTON.

It has already been demonstrated that profitable crops of Meade cotton can be produced in the presence of the boll weevil and under the usual methods of growing cotton as practiced in the Southeast; but in order to produce the largest possible yields, as well as to induce the plants to set a crop from 10 days to two weeks earlier, the new single-stalk method of culture is being applied to Meade cotton on a farm in southern Georgia.

The new method of culture is based upon the fact that the cotton plant has two kinds of branches, the vegetative branches, usually called "wood limbs" in the Southeastern States, and the fruiting branches that bear the flowers and fruits. The wood limbs are like the central stalk, bearing no bolls directly, the bolls being borne on fruiting branches which are later than those of the main stalk. By chopping the cotton a little later and leaving the plants closer together in the rows the wood limbs are suppressed, thus allowing more plants to stand in the rows without crowding and allowing more fruiting branches to develop and mature an early crop (*4*). Growers of Meade cotton will be interested in the following summary (*12*) of the single-stalk method and the results that are being obtained.

Twenty-five to 100 per cent increase in yield is reported by cotton growers who have adopted the new close-spacing system of cotton culture, introduced

[9] Bales of long-staple cotton containing dirt or trash are more heavily penalized in the market than bales of short cotton.

FIG. 1.—IDENTIFYING HYBRIDS AND OFF-TYPE PLANTS.

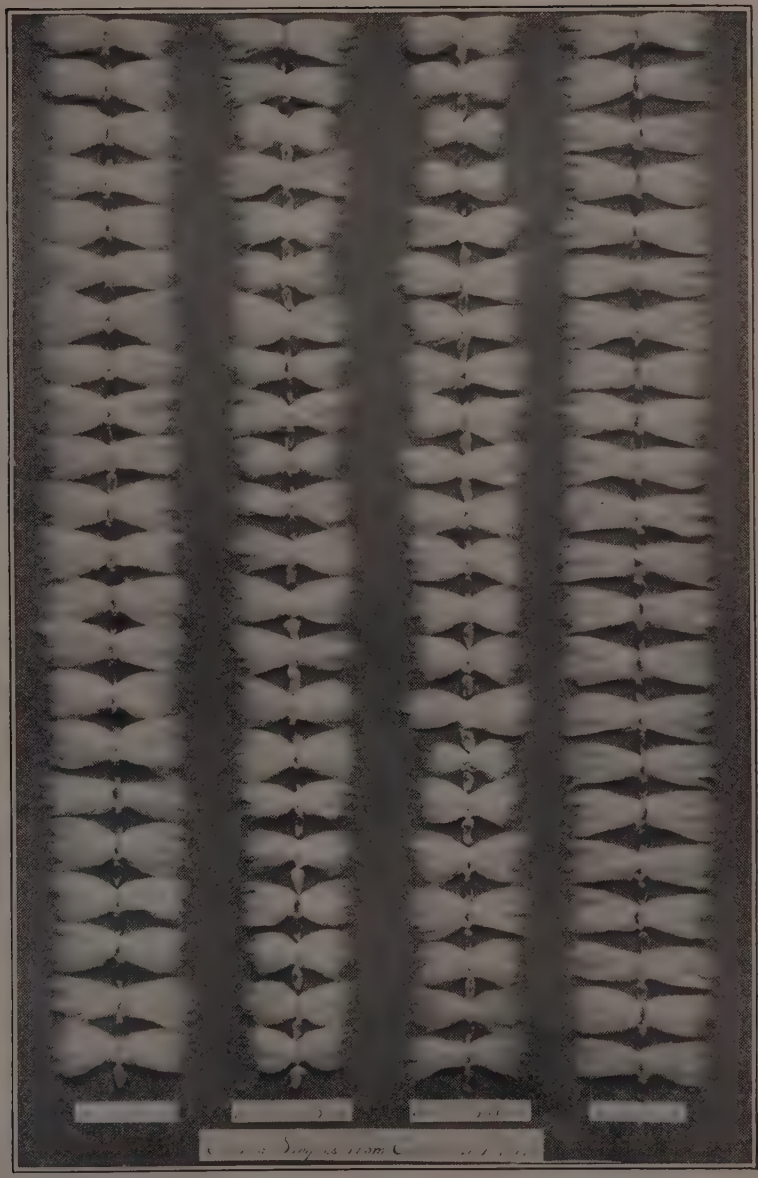
Plants to be destroyed can be easily distinguished in general field roguing from a slight elevation, as afforded by a horse or mule. A boy can be brought along to pull up the undesirable plants.

FIG. 2.—MORE INTENSIVE ROGUING OF A SELECTED FIELD OF MEADE COTTON IN WORTH COUNTY, GA., 1921.

FIELDS OF MEADE COTTON AT THE TIME OF ROGUING.

BALES OF SHORT-STAPLE AND MEADE COTTON.

A bale of Meade cotton (at right) weighing 400 pounds, compared with the usual 500-pound bale of short cotton. The Meade bale is completely covered by strong burlap and sold on sample taken at the gin, thus affording complete protection for the fiber.



SAMPLES OF LINT, SHOWING THE EFFECT OF SELECTION ON THE UNIFORMITY OF MEADE COTTON.

The two center rows show combed lint from consecutive plants in the original unselected stock. The two outside rows show combed lint from consecutive plants in selected stock. Note the uniformity of fiber and seed in the selected stock as compared with the irregularity of both fiber and seed in the unselected stock. (One-fourth natural size.)

8 or 10 years ago by the United States Department of Agriculture. Reports coming directly to the department and to southern agricultural journals which have interested themselves in encouraging the new system show that farmers throughout the cotton regions of the country are rapidly turning to the plan. Increased yield, less labor and expense for the same crop, and a lessening of boll-weevil damage are among the benefits recited in hundreds of letters written by farmers in various parts of the South. Indications are that the system will be adopted far more widely the coming season.

SPACE PLANTS A HOE WIDTH APART.

The close spacing, more commonly known as the single-stalk method of cotton culture, consists primarily in spacing the cotton plants so close in the row—a hoe width apart—that the lower or vegetative branches do not develop, and the growth of the plant goes directly into the upper or fruiting branches, permitting them to begin the development of blossoms and bolls earlier and giving them more nourishment and more light.

The cultural ideal under the new system is a cotton plant with only the single, erect, central stalk bearing numerous well-developed fruiting branches, but none of the vegetative branches or secondary stalks. The suppression of the vegetative branches is easily accomplished by leaving the young plants close together in the rows. Thinning is deferred until the plants are some 6 to 8 inches high, or even later under conditions of rank growth. If the young plants stand less than 6 inches during these early stages of growth, more of them will not produce many vegetative branches, but will have only the upright central stalk and the horizontal fruiting branches.

The distance between the plants is regulated with reference to local conditions and the habit of growth of different varieties, the range being between 6 and 12 inches. The plants then have a narrow upright form and can be left closer together in the rows. Even with the plants only 3 or 4 inches apart in the rows there may be less injurious crowding than with large many-stalked plants 3 feet apart in the rows. The distance between the rows, usually 3½ feet, can also be varied with reference to local conditions, but crowding the rows together so that the sun does not reach the ground is undesirable, especially under weevil conditions.

SMALL PLANTS MAY OUTYIELD LARGE ONES.

In the way of production two distinct advantages are gained: The smaller single-stalked plants, free from any large unproductive offshoots, proceed at once to the development of the branches which produce cotton bolls, and in many cases these small plants produce almost as many bolls and a better quality of lint than large many-stalked plants occupying the space of three of the smaller. The bolls also are produced much earlier on the small plants and are more likely to escape injury by the boll weevil.

The Egyptian cotton industry of the Southwest, which was established as a result of the work of the Department of Agriculture and has added $20,000,000 a year to the annual agricultural income of the country, could not have been accomplished, in the opinion of department specialists, without the new close-spacing system for controlling the vegetative branches. The benefits to the $2,000,000,000 cotton crop of the country at large, with continued extension of the new method, can only be faintly estimated.

PROBLEM OF SEED SUPPLY OF MEADE COTTON.

The successful substitution of Meade cotton for Sea Island will depend largely upon the extent of cooperation developed between the farmers and ginners to establish and maintain a supply of pure seed. The purity of a stock can not be maintained if more than one variety is grown in the same or in an adjacent field, for hybridization by insects that visit the flowers is sure to follow. The failure of the Sea Island growers to appreciate the importance of complete isolation and clean ginning for their cotton has been responsible for the popular idea that varieties are bound to run out and that new seed must be secured every few years. They have failed to appreciate the fact that the growers of fine Sea Island cotton on the islands off the coast of South Carolina, from whom their new supplies of seed were obtained, maintained the purity of their stocks by growing only one variety, selecting their seed for planting each year and ginning their crop on their own private gins. The present flourishing Egyptian cotton industry in Arizona owes its success to an early appreciation of the fact that the purity and high quality of the product could not be maintained if more than one variety of cotton were grown in the same community.

The demand for seed of Meade cotton is becoming increasingly large, and efforts are being made to develop an adequate supply of pure seed as soon as possible. Progress has been slower than was anticipated, however, because of the lack of cooperation between the growers and ginners, resulting from the failure of the farmers to appreciate the necessity for clean ginning and of the ginners to appreciate their responsibility to the community in assisting in the maintenance of pure stocks of seed.

With the decrease of Sea Island cotton production these ginning difficulties are likely to be less serious, but there will still remain the necessity for the constant selection and complete isolation of Meade cotton from which seed for planting is to be obtained. Hybrids between the Sea Island and Meade cottons are easily detected and can be rogued out in the early part of the season, but crosses between the Meade and short cotton can be distinguished only with great difficulty before the fiber and seed can be examined, and then the damage by cross-pollination has already been done.

SELECTION NECESSARY TO MAINTAIN UNIFORMITY.

No matter how well selected the Meade stock may be, continuous selection will be necessary to maintain uniformity in the fiber. In the most carefully selected stocks inferior plants will appear; and if these are permitted to remain in the field, insects that visit the flowers carry the pollen from the bad plants to the good ones, and the seed produced by such plants is generally of inferior quality.

The following paragraphs on seed selection appear in a pamphlet sent out by the United States Department of Agriculture (*8*) with the distribution of seed:

Unless selection is continued, the value of a variety is sure to decline. A well-bred variety is superior to ordinary unselected cotton not only in having better plants, but in having the plants more nearly alike. Whether selection has any power to make better plants is a question, but there can be no doubt of the power of selection to keep the plants alike. Even in the best and most carefully selected stocks inferior plants will appear, and if these are allowed to multiply and cross with the others the stock is sure to deteriorate. The pollen from the flowers of inferior plants is carried about by bees and other insects, and the seeds developed from such pollen transmit the characters of the inferior parent. Even if they do not come into expression in the first generation they are likely to appear in the second generation.

To grow cotton from unselected seed involves the same kind of losses as in an orchard planted with unselected seedling apple trees. Less cotton is produced and the quality is also inferior. The higher the quality of the cotton the more stringent is the requirement of a uniform staple. Unless the fibers have the same length and strength they can not be spun into fine threads or woven into strong fabrics. (Pl. IX.)

PRESERVATION OF VARIETIES BY SELECTION.

The method of selection to be followed in preserving a variety from deterioration is entirely different from that employed in the development of new varieties. The breeder of new varieties seeks for exceptional individuals and prefers those that are unlike any variety previously known. If the selection is being carried on to preserve a variety, the object is not to secure seed from the peculiar plants, but to reject all that deviate from the characters of the variety. The first qualification for such selection is a familiarity with the habits of growth and other characters of the variety, to enable the farmer or breeder to confine his selection to the plants that adhere to the form or type of the variety and to reject all that vary from the type. Most of the latter would prove to be very inferior and at the same time would increase the diversity of the variety and hasten its degeneration.

IMPROVED METHODS OF FIELD SELECTION.

No matter how good a new variety may be or how carefully it may have been bred and selected, inferior plants are likely to appear, especially when it is grown under new and unaccustomed conditions. A special effort is being made to limit the distribution to seed from uniform fields of cotton, but selection is necessary to keep any variety from deterioration, and it is inadvisable to wait until the deterioration becomes serious before beginning the selection. If proper attention be paid to the roguing out of inferior plants in the first season there may be much less variation in the second, the variety becoming better adjusted to the new conditions.

As uniformity is one of the first essentials of value in a variety, the behavior of a new variety in this respect is one of the first things to be noted. Do not wait till the crop matures, but watch the plants in the early part of the season. Even before the time of flowering it is possible to distinguish "freak" plants by differences in their habits of growth or the characters of their stems and leaves. Whenever such variations can be detected the plants should be pulled out at once in order to prevent the crossing of the good plants with infe-

rior pollen. After the bolls begin to reach mature size it is well to go through the plat again and pull out all plants that show by the small size or other peculiarities of the bolls that there has been a variation from the standards of the variety. These preliminary selections greatly simplify the final selection in the fall, when attention can be limited to the yield and to the characters of the lint and seeds (*2, 3*). (Pls. X and XI.)

USE OF PROGENY ROWS IN SELECTION.

Selection can be made still more efficient by the use of progeny rows. The seed of select individual plants is picked separately into paper bags and planted the next season in adjacent rows, in order to test the behavior of the progenies of the different individuals. An inferior progeny can be rejected as a whole and selection limited to the best rows. It often happens that a very good plant produces a comparatively inferior progeny, which would not be excluded from the stock unless the progeny-row test were made.

Nevertheless, the use of progeny rows is no substitute for skill and care in making the selection, for if the selected plants are not all of the true type of the variety, admixture by cross-pollination will occur in the progeny rows the same as in a mixed planting. Protection against the danger of crossing between different progenies can be secured by holding over a part of the seed of the select individuals used to plant the progeny rows. The remainder of the seed that produced the best progeny row can be planted in an isolated breeding plat in the year following the progeny test. In this way a special strain is developed from a single superior plant.

SPINNING TESTS OF MEADE COTTON.

That interest in the new Meade variety was being manifested by New England manufacturers was shown by the purchase of several bales of this fiber in 1918 for the purpose of conducting comparative spinning tests with the Sea Island and Egyptian cottons. The results of one of these tests comparing the Meade and the Egyptian Sakellaridis cottons are shown in Table 3.

Commenting on the general merits of the variety, the officers of the company making the tests reported in Table 3 state:

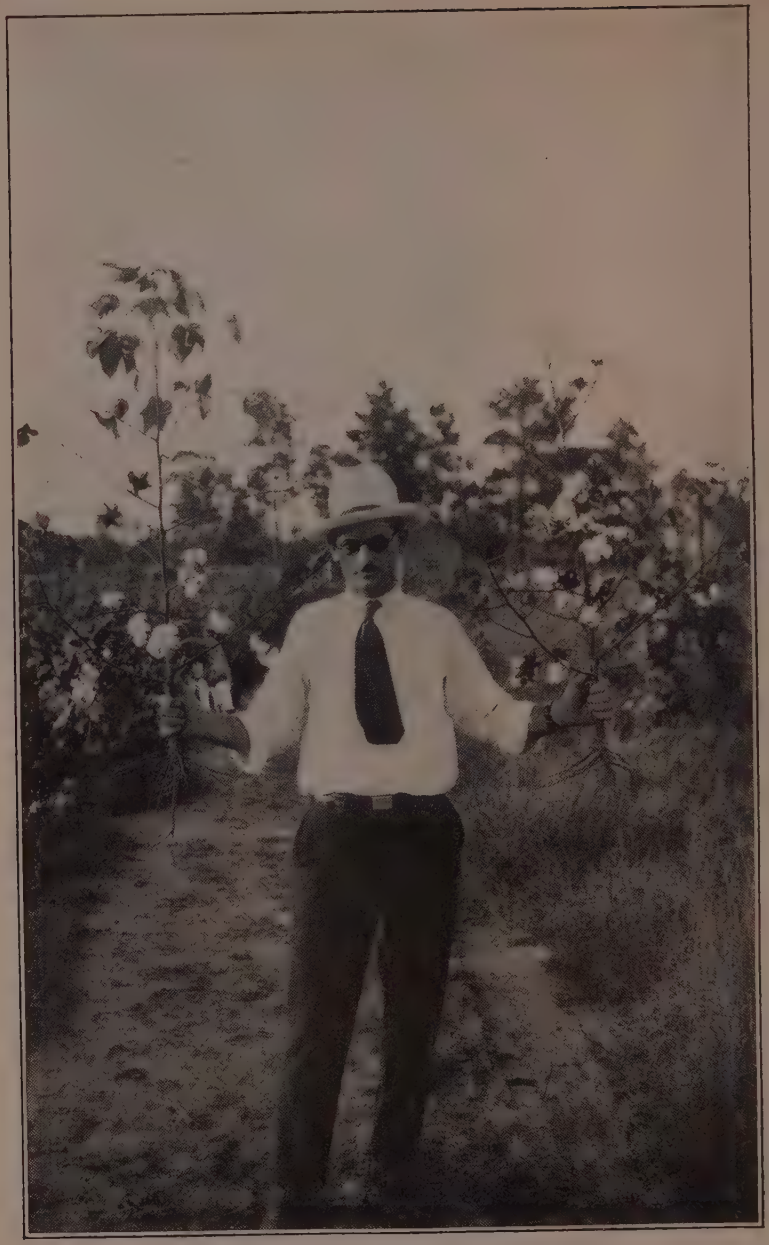
> The Meade cotton ran equally as well in all processes, and the only material difference was the lessening of twist in the speed frames to an extent of 20 per cent. We consider the Meade to be a very desirable cotton and would suggest the encouragement of its growth on as large a scale as possible.

Comparative tests of Sea Island and Meade cotton conducted by the Bureau of Markets were summarized in the annual report of that bureau for the fiscal year ended June 30, 1920 (*13*, p. 20–21).

These spinning tests were conducted at the New Bedford Textile School and consisted in spinning the various cottons into different numbers of yarns to determine the comparative waste content of the cotton and the tensile strength of the yarn. The tensile-strength tests were made in the cotton-testing laboratory in Washington, D. C., under 65 per cent relative humidity.

MEADE COTTON IN GEORGIA FROM SELECTED SEED.

An isolated field of Meade cotton from selected seed at Artesia, near Sylvester, Ga., grown to increase the stock of good seed and for further selection.



VARIANT FORMS OF MEADE COTTON PLANTS.

A typical open plant is shown at the left, and an undesirable semicluster plant at the right. The desirable type of Meade plant is of open growth with rather long jointed fruiting branches having 15 to 20 bolls. Many of the undesirable plants are short jointed or "semicluster," often bearing good crops, but usually producing short fiber and fuzzy or "tight" seeds.

TABLE 3.—*Results of comparative spinning tests of Meade and Egyptian Sakellaridis cottons in 1918.*

Items of comparison.	Extra fine Sakellaridis, size No. 120.	Meade, size No. 120.	Good Sakellaridis, size No. 100.	Meade, size No. 100.
Loss:				
Scutching.....per cent..	3.00	4.96	3.50	4.96
Carding.....do....	6.00	6.50	6.50	6.50
Combing.....do....	21.50	21.50	21.50	21.50
Total.....do....	30.50	32.96	31.50	32.96
Strength.....pounds..	15.90	15.50	18.58	18.50
Yarn counts.....	116.50	116.50	97.50	97.50

The Sea Island and Meade tests were conducted in cooperation with the Bureau of Plant Industry to determine the advisability of urging farmers to plant the Meade variety instead of the Sea Island. The results of the waste tests gave the Sea Island cotton 21.9 per cent and the Meade 26.6 per cent. The results of the tensile-strength tests on these cottons are given in Table 4.

These tests were conducted during the fiscal year 1918–19 to determine the relative value from the spinner's point of view of Sea Island and Meade cottons in the manufacture of airplane fabric. Both of these cottons were $1\frac{5}{8}$ inches in length of staple and about equal in grade. The result of this test indicated that Sea Island cotton was about 5 per cent less wasty than the Meade and from 8 to 20 per cent stronger, depending upon the number of yarn spun.[10]

TABLE 4.—*Breaking strength of Sea Island and Meade cottons in pounds per skein of 120 yards.*

Size of yarn.	Sea Island (fancy, $1\frac{5}{8}$ inches) twist factor.			Meade (S. G. M., $1\frac{5}{8}$ inches) twist factor.		
	3.25	3.50	3.80	3.25	3.50	3.80
No. 100.....pounds..	17.78	17.60	17.18	16.18	16.33	16.00
No. 80.....do....	25.71	25.91	25.52	24.43	24.09	23.20
No. 60.....do....	39.90	39.40	38.78	35.77	35.38	34.92
No. 40.....do....	69.50	69.75	68.48	58.74	60.09	56.93
No. 28.....do....	128.7	128.0	122.2	108.4	109.2	103.3

[10] Mr. D. E. Earle, then specialist in cotton classing, Bureau of Markets, in charge of these tests, stated that the Sea Island bale used was much superior to the average Georgia Sea Island cotton. In fact, several hundred bales of Sea Island cotton grown in the vicinity of Statesboro, Ga., were examined before one was found of length and grade equal to the Meade. In order to make the test strictly comparable, the two bales were run through all machinery at the same settings, no attempt being made to adjust the machinery to the best advantage for either of the cottons used. But it was found after the test had been made that the Meade comber waste contained considerable long fiber which if it had not been rejected by the comber would have materially reduced the total percentage of waste shown for the variety. This rejection of long fiber by the comber possibly was due to the Meade fibers not being made parallel to the same degree as the Sea Island in the drawing preparatory to the formation of the comber lap. If the Meade fiber had been further drawn before combing, doubtless fewer long fibers would have been rejected and the consequent waste would have been reduced.

During the 1920 season additional spinning tests were conducted by the United States Department of Agriculture, through the cotton-testing specialists of the Bureau of Markets, on representative bales of Meade and Sea Island cottons.

The results of these tests were published in Bulletin 946 (7) entitled "Comparative spinning tests of Meade and Sea Island cottons,"[11] from which the data in Table 5 have been taken.

TABLE 5.—*Percentages of waste obtained and breaking strength of various sizes of yarns spun from Meade and Sea Island cottons grown in different seasons.*

Items of comparison.	1916–17		1918–19		1919–20		
					Meade.		
	Meade.	Sea Island.	Meade.	Sea Island.	Sandy soil.	Clay soil.	Sea Island.
Visible waste:							
Pickers [a] ..... per cent..	1.80	1.04	1.63	1.63	2.34	3.14	1.05
Cards [a] ..... do....	7.66	7.04	5.70	5.32	6.49	10.01	5.03
Combers [a] ..... do....	22.45	23.26	19.39	15.03	18.85	16.12	15.20
Total visible [b] ..... do....	29.48	29.34	24.82	20.55	25.51	26.10	19.79
Invisible waste [b] ..... do....	.74	.27	2.12	.74	2.54	3.97	3.63
Total visible and invisible waste from pickers, cards, and combers [b] .. per cent.	30.22	29.61	26.94	21.29	28.05	30.16	23.42
Size of yarn (3.50 twist multiplier used):							
No. 10 ..... pounds [c] ..			60.1	69.8			
No. 23 ..... do....	129.7	144.7	109.2	128.7	103.8	107.69	122.6
No. 40 ..... do....					54.6	53.5	58.5
No. 60 ..... do....			35.4	39.4	33.7	30.7	34.8
No. 80 ..... do....			24.1	25.9	22.6	19.6	22.3
No. 100 ..... do....	15.2	17.4	16.3	17.6	15.5	12.8	15.6

[a] Based on the net weight fed to the respective machines.
[b] Based on the net weight fed to the opener picker.
[c] Per skein of 120 yards.

The results of these tests are summarized in the bulletin cited, as follows:

The grade and staple of the Meade and Sea Island cottons tested were practically equal for the seasons of 1916–17 and 1918–19, but were unavoidably different for the season of 1919–20.

The cotton was run under as nearly identical conditions as possible.

Averaging the visible waste for the three seasons, it was found that the Meade cotton was 3.50 per cent more wasty than the Sea Island.

Comparing the breaking strength of the Meade and Sea Island yarns for the three seasons, a difference of 17.2 pounds was found in favor of the Sea Island for the 23's yarn and 1.68 pounds for the 100's yarn. Under the adverse weather conditions during the growing season of 1919–20, the breaking strength of the sandy-soil Meade was equal to that of the Sea Island for the finer numbers of yarn.

CONCLUSIONS.

Experiments with Meade cotton through several years under a variety of soil and climatic conditions in the Sea Island belt have demonstrated that this variety can be substituted for Sea Island

[11] Copies of this bulletin may be obtained without cost upon application to the United States Department of Agriculture.

without disturbing the conditions under which that cotton was produced and marketed.

The harvesting and ginning of Meade cotton should be done with the same care and in the same manner as for Sea Island cotton if comparable returns are to be expected. When so harvested and ginned the Meade cotton causes no change in the customs of the Sea Island markets and is readily accepted on a par with Sea Island cotton.

So closely does the Meade fiber resemble the Sea Island that it can not be distinguished except by experts, and it has been sold on the regular Sea Island markets at a premium over the Sea Island fiber.

Profitable crops of Meade cotton have been produced in the presence of the boll weevil, and comparative experiments indicate that this new long-staple variety is as early and as prolific as the short-staple cottons that are now being grown in the South Atlantic coast districts.

Some difficulty has been experienced with the ginning of Meade cotton because of the failure of the large seeds of this variety to pass through the seed grids of the Sea Island gins as rapidly as the Sea Island seeds, consequently slowing down the ginning process. To meet this difficulty a new seed grid has been manufactured and placed on the market, designed especially to handle the large Meade seeds. This grid can be adjusted to the regular Sea Island gins. It is also possible to use the old grids successfully by moving them back from the hacker bar one-half to three-fourths of an inch.

The production and maintenance of an adequate supply of pure seed is the most acute problem confronting the growers of Meade cotton at this time. Communities of farmers are being encouraged to organize for the purpose of growing only Meade cotton and to keep up the standard of the variety by continued selection and careful ginning on a locally controlled gin. Such organizations can market their crops more directly in large lots of uniform fiber, and better prices can be obtained. Communities organized to grow Meade cotton are more necessary than with Sea Island because Upland hybrids can be easily recognized in Sea Island cotton while Upland hybrids in Meade cotton are difficult to distinguish, so that the precaution of isolating the fields from any possible contamination with short cotton is even more important than when the Sea Island cotton was grown.

The only other solution of the problem seems to lie along the lines that have been followed for years in connection with the Sea Island industry; that is, a few of the more intelligent farmers with private ginning equipment must produce sufficient seed to supply the whole section. Until the organization of communities is effected the latter method seems to offer the better prospects of success, for several of the larger growers of Meade cotton have already installed or intend to install complete ginning equipment for the exclusive handling of this variety.

Spinning and manufacturing tests of the Meade fiber in comparison with both the Sea Island and Egyptian cottons have shown that the difference between these fibers, especially in the finer yarns, is so slight as to be practically negligible.

Although the percentage of waste for Meade fiber is somewhat higher with the same organization of the spinning machinery, such waste may be reduced, if not avoided altogether, by slight changes of adjustment that would be made for the regular spinning of Meade cotton.

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